

ABSTRACT OF THE DISCLOSURE

Embodiments of the present invention generally relate to an apparatus and method for delivering two separate gas flows to a processing region. One embodiment of a substrate processing chamber adapted to deliver two separate gas flows to a processing region comprises a substrate support having a substrate receiving surface and a showerhead disposed over the substrate receiving surface. The showerhead includes a first passageway having a plurality of first passageway holes and a second passageway having a plurality of second passageway holes. The first passageway is adapted to deliver a first gas flow through the first passageway holes to the substrate receiving surface. The second passageway is adapted to deliver a second gas flow through the second passageway holes to the substrate receiving surface. The substrate processing chamber further includes a plasma power source. The plasma power source may be in electrical communication with the showerhead or with the substrate support to generate a plasma from gases between the showerhead and the substrate support. One embodiment of a method of delivering two separate gas flows to a processing region comprises performing one or more of processes from the group including forming a titanium layer by plasma enhanced chemical vapor deposition, forming a passivation layer by a nitrogen plasma treatment of a titanium layer, forming a composite titanium/titanium nitride layer by an alternating plasma enhanced chemical vapor deposition and a nitrogen plasma treatment, forming a titanium nitride layer by thermal chemical vapor deposition, and plasma treating a titanium nitride layer.